

Modeling and Performance Evaluation of "Continuity" in a Representative Staff Model Health Maintenance Organization

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Background. The concept of continuity in medicine is fundamental and it refers to the delivery of medical care to a patient by a care provider in an uninterrupted and coordinated manner and in accordance with the medical care needs of the patient. This paper models continuity of care delivered to a patient by a care provider in a representative staff model HMO clinic in suburban Arizona, simulate patient visits that are generated stochastically through utilizing the number of patient visits and patient population distribution by age at CIGNA Health Care, Chandler, Arizona, and evaluate continuity measures assuming a scheduler that aims to maximize continuity.

A new measure of continuity – Fundamental Continuity of Care Index (FCCI), is introduced and measured for the representative HMO clinic. FCCI measures are also obtained for different means μ of the uniform probability distribution that generates the patient-doctor interaction lengths.

Methods. Based on the summary data from CIGNA, a stochastic model is designed to synthesize the visit patterns of patients, their ages, their primary doctors, and the length of the interaction episodes. The scheduler, by design, attempts to schedule patients with their primary doctors subject to availability.

Results. A simulation of a total of 55,056 patient visits corresponding to 18,324 patients over a three year period indicates that while 94% to 97% of the

patient visits are with the primary care provider, patients spend 76% to 77% of the nominal total visit time with their primary care provider, leading to FCCI values ranging from 0.72 to 0.75. The FCCI measure increases with the addition of more providers, as expected. The average FCCI values corresponding to different μ values for a representative clinic constrained by a given number of patients with known age distribution and a fixed number of providers, reveal an approximate bell shaped graph. For values of μ ranging from 5 minutes to 10 minutes, 15 minutes, 20 minutes, 25 minutes, 35 minutes, 45 minutes, and 55 minutes, the average FCCI measure starts at 0.49, increases to a maximum of 0.88 corresponding to a mean of 25 minutes, and then decreases to 0.60.

Conclusions. The FCCI measure reflects the fundamental idea underlying continuity and is, therefore, a more accurate measure. FCCI may be improved through introducing more providers and, even in a constrained representative HMO clinic, an optimum value of μ may be obtained empirically to achieve maximal FCCI measure.

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